Remarks

Favorable review is requested in view of the above amendments and following remarks. Editorial amendments have been made to claims 1 - 2, 4 - 7, and 11 and are supported for example, at page 18, lines 8 - 9 and page 18, line 25 - page 19, line 4 of the specification. New claim 16 is supported for example, at page 19, lines 1 - 2 of the specification. No new matter has been added. Claims 1 - 16 remain pending in the application.

Restriction

The Examiner has withdrawn claims 13 - 15 from consideration as being directed to a non-elected invention. Applicants will amend claims 13 - 15 to track the product claims once the product claims are allowed.

Rejections under 35 U.S.C. § 112

Claims 1 - 12 were rejected under 35 U.S.C. § 112, first and second paragraph, as not being possessed by the applicants and being indefinite. Applicants respectfully traverse this rejection.

Claim 1 and the corresponding relevant claims have been amended for editorial purposes. Claims 2 - 11 depend from claim 1. Applicants believe that the claims comply with 35 U.S.C. § 112, and request favorable reconsideration.

The specification was objected to for failing to provide proper antecedent basis for the claimed subject matter. The limitation of "continuous fiber non-woven fabric" has been amended and thus, the objection is considered moot. Withdrawal of the objection is requested.

Claim 12 was considered vague and indefinite because the Examiner was confused about the units being referred to in claim 12. The terminology "trapped particle diameter in 0.2 MPa" refers to the trapped particle diameter when the pressure loss of the filter cartridge reaches 0.2 MPa. See page 37, lines 4 - 8 of the specification. In addition, table 2 of the specification indicates the "trapped particle diameter in 0.2 MPa" has units of μm. Therefore, the ratio is "trapped particle diameter in 0.2 MPa/initial trapped particle diameter" and can be calculated using the appropriate columns in table 2. Withdrawal of the rejection is requested.

Rejection under 35 U.S.C. § 103

Claims 1 - 5 and 10 - 12 were rejected under 35 U.S.C. § 103(a) as being unpatentable over JP 4 - 45811 in view of Pike et al. (U.S. Patent 6,090,731). Applicants respectfully traverse this rejection, and respectfully request reconsideration in view of the following comments.

The Examiner maintains that Pike et al. "suggests that such an arrangement (a non-woven filter medium) has a high filtration efficiency and physical strength." See lines 17 - 20 of Pike et al. However, a comparative experiment was performed between the filter cartridges used for examples 4 and 11 of the present invention and that of Pike et al. The results and experimentation are explained in detail in the previously filed YAMAGUCHI Declaration. In summary, the filter life of the present invention was much longer than that of Pike et al., which is an unexpected result. See page 3 of the YAMAGUCHI Declaration. In particular, the filter life of Example 11 of the present invention is over 200 times longer than that of Example 5 in Pike et al.

In addition, the present invention has superior properties to JP '811. The filter cartridge described for Comparative Example 3 of the present application (see page 46 of the specification) is analogous to that of JP '811. The initial trapped particle diameters of Comparative Example 3 and Example 20 are 10.1 and 10.0 μm, respectively, which are almost identical. See Table 2 of the specification. However, the initial pressure loss, trapped particle diameter in 0.2 MPa, and filter life of Comparative Example 3 are 0.010 MPa, 13 μm, and 80 minutes, respectively. Whereas, the initial pressure loss, trapped particle diameter in 0.2 MPa, and filter life of Example 20 are 0.003 MPa, 10 μm, and 225 minutes, respectively. These characteristics represent unexpected results, and unexpected results can rebut prima facie obviousness. See MPEP § 716.02(a). Therefore, the claimed invention is patentable over JP '811 in view of Pike et al. Withdrawal of the rejection is requested.

Furthermore, even if the Pike et al. and JP '811 were combined, they would not be expected to achieve the properties of claimed invention. At most, the properties would be somewhere in between the two inventions (Pike et al. and JP '811), not exceeding them, as the present claimed invention does. Consequently, the unexpected results, as indicated above, rebut any prima facie obviousness. Withdrawal of the rejection is requested.

Claims 7 - 9 were rejected under 35 U.S.C. § 103(a) as being unpatentable over JP 4 - 45811 in view of Pike et al. and further in view of JP 1 - 115423. Applicants respectfully traverse this rejection, and respectfully request reconsideration in view of the following comments.

JP 4 - 45811 and Pike et al. are distinguished above as failing to describe or suggest a filter cartridge that is made from a continuous fiber non-woven thermoplastic fabric. JP 1 - 115423 is relied upon to suggest pleating. Even if it does, which is not being conceded, this reference fails to remedy the noted shortcomings of the other references. Thus, withdrawal of the rejection is requested.

Conclusion

In view of the amendments and comments presented herein, favorable reconsideration in the form of a Notice of Allowance is respectfully requested. If any further questions should arise, the Examiner is invited to contact Applicant's representative at the number listed below.

Respectfully submitted,

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Version with Markings to Show Changes Made

In the Claims

Please amend claims 1 - 2, 4 - 7, and 11, as indicated herein.

1. (Thrice amended) A filter cartridge comprising a strip, [continuous fiber] spun bonded non-woven fabric [prepared using a spun bonding method], the fabric comprising a thermoplastic fiber in which at least a part of fiber intersections is thermally adhered by a thermal compression bonding method or a method using a heat treating machine of a hot blast-circulating type, a heat through-air type, an infrared heater type, or a vertical hot blast-blowing type, wherein the strip, [continuous fiber] spun bonded non-woven fabric is wound around a perforated cylinder in a twill form.

2. (Twice amended) The filter cartridge as described in claim 1, wherein the thermoplastic fiber constituting the [continuous fiber] spun bonded non-woven fabric is a thermally adhesive composite fiber comprising a low melting point resin and a high melting point resin, the difference in a melting point of both the resins being 10°C or more.

4. (Twice amended) The filter cartridge as described in claim 1, wherein the [continuous fiber] spun bonded non-woven fabric is bonded by thermal compression by means of a heat embossing roll.

5. (Twice amended) The filter cartridge as described in claim 2, wherein the fiber intersections of the [continuous fiber] spun bonded non-woven fabric are bonded by hot blast.

6. (Twice amended) The filter cartridge as described in claim 1, wherein the strip, [continuous fiber] spun bonded non-woven fabric is twisted.

7. (Twice amended) The filter cartridge as described in claim 1, wherein the strip, [continuous fiber] spun bonded non-woven fabric is formed into a pleated matter having 4 to 50 pleats and wound around a perforated cylinder in a twill form.

11. (Twice amended) The filter cartridge as described in claim 1, wherein the [continuous fiber] spun bonded non-woven fabric has a slit width of 0.5 cm or more, and a product of the slit width (cm) and the basis weight (g/m^2) is 200 or less.

New claim 16 has been added.